Claims

1. A method of converting an input beam of non-polarized light having a waist of predetermined height and width in a predetermined plane to an output beam of polarized light having a geometrical extent increased from that of said input beam by no more than a factor of two, said method comprising:

a) positioning a polarizing beam splitter with an input surface having a height and width equal to a predetermined height and width in a predetermined plane, thereby dividing said input beam into perpendicular P and S polarized components;

b) passing said P component light beam through a ½ wave retarder, whereby the light beam exiting said ½ wave retarder has the same polarization as said S component light beam;

c) positioning a turning prism in the path of said S component light beam to direct said S component light beam passed therethrough parallel to and laterally adjacent said P component light beam exiting said ½ wave retarder, said P and S component light beams exiting said ½ wave retarder and said prism jointly forming an output beam having a geometrical extent exceeding that of said input beam by a factor of substantially two; and

d) confining said P and S components by Total Internal Reflection (TIR) in said polarizing beam splitter and said prism, respectively.

2. The method of claim 1 wherein said TIR is achieved by providing a first air gap between parallel, opposing surfaces of said polarizing beam splitter and said prism, and a second air gap between parallel, opposing surfaces of said polarizing beam splitter and said ½ wave retarder.

3. The method of claim 1 wherein said TIR is achieved by providing a first layer of low refractive index optical cement between opposing surfaces of said polarizing beam splitter and said prism, and a second layer of low refractive index optical cement between opposing surfaces of said polarizing beam splitter and said ½ wave retarder.

4. The method of claim 1 wherein said output beam is directed as polarized input light to a liquid crystal based projector.

5. The method of Claim 1 wherein said beam waist is elliptical and said input surface is rectangular.

6. The method of Claim 1 wherein said turning prism includes parallel side surfaces and said S component light beam is confined in said turning prism by TIR by said side surfaces.

7. A non-imaging polarization conversion method comprising:

a) generating a beam of collimated light having a waist of predetermined height and width in a predetermined plane;

b) positioning a planer, rectangular input surface of a polarizing beam splitter in said predetermined plane, said surface having a height and width equal to a predetermined height and width, a first portion of said input beam passing through said polarizing beam splitter as a P component light beam and a second portion of said beam being reflected by said polarizing beam splitter as an S component light beam;

c) positioning a turning prism in the path of said S component light beam to redirect said S component light beam in a

path parallel to and laterally adjacent said P component light beam; and

d) confining said P and S component light beams by Total Internal Reflections (TIR), respectively.

8. The method of Claim 7 and further including passing said S component light beam though a ½ wave retarder, thereby placing said S component light beam in phase with said P component light beam.

9. The method of Claim 8 wherein said TIR is achieved by providing a first air gap between parallel, opposing surfaces of said polarizing beam splitter and said prism, and a second air gap between parallel, opposing surfaces of said polarizing beam splitter and said ½ wave retarder.

10. The method of Claim 8 wherein said TIR is achieved by providing a first layer of low refractive index optical cement between opposing surfaces of said polarizing beam splitter and said prism, and a second layer of low refractive index optical cement between opposing surfaces of said polarizing beam splitter and said ½ wave retarder.

11. The method of Claim 8 wherein said waist is elliptical.